APPENDIX B.2 ST. JOSEPH RIVER (LAKE MICHIGAN) SERVICE AREA
ELEMENT 1. SERVICE AREA DESCRIPTION

The St. Joseph River Service Area (SA) is located in northeastern Indiana. It includes the following 8-digit HUC watershed:

- 04050001 - St. Joseph River

The St. Joseph River SA includes all or portions of the seven Indiana counties listed below in the Northern Moraine and Lake Region physiographic region.

St. Joseph	Kosciusko	LaGrange	Steuben
Elkhart	Noble	DeKalb	

The St. Joseph River drains to Lake Michigan at St. Joseph, MI. Approximately 42 miles of the 210 mile long St. Joseph River reside within two counties of Indiana, Elkhart and St. Joseph; a majority of the river travels through farmland (FotSJR, 2016). Major tributaries discharging to the St. Joseph River within Indiana include Fawn River, Elkhart River, and Little Elkhart River.

Approximately 1,685 square miles of the 4,685 square mile St. Joseph Watershed is located in northeastern Indiana; the remainder is located in southwestern Michigan. The St. Joseph River SA is located in the Northern Indiana Drift Plains and is characterized by pothole lakes, ponds, marshes, and bogs; land cover is dominated by corn, soybean, wheat, and livestock farming (U.S. EPA: Ecoregions of Indiana). Currently, the St. Joseph River SA is dominated by a mix of agriculture, developed land uses, pasture/hay, and woody wetlands.

Based on the 2011 NLCD, the land cover type with the most area in the St. Joseph River SA is agricultural land use (60.83%), followed by developed and impervious land use (18.82%), wetlands and open water (12.89%), and forest and shrub/scrub (7.61%) (Homer, et al., 2015). Woody wetlands are the prominent wetland type and range from approximately 4.77% of the SA cover per the NWI up to 10.13% per the 2011 NLCD. Emergent herbaceous wetlands range from approximately 0.42% per the 2011 NLCD to 2.45% per the NWI.

ELEMENT 2. THREATS TO AQUATIC RESOURCES

Aquatic resource threats specific to the St. Joseph River SA have been identified using the same approach as the statewide portion of the CPF. As objectively as possible, the threats are generally presented in the order of the current predominance within the SA.

2.1 Section 404 Permitted Impacts

The Corps Section 404 permit data for impacts that required mitigation in the St. Joseph River SA from 2009 – 2015 was collected and analyzed **(Table 28)**. According to the data, 2.28 acres of impacted wetlands and 1,430 linear feet of impacted streams required mitigation during the period of analysis.

The transportation and service corridor work type accounted for 100% of permitted stream impacts. There were no documented stream impacts requiring mitigation for agricultural land use, dam related activities, development, or energy production and mining for this time period in this SA.

The development work type accounted for the most wetland impacts (80.96%), followed by dam related activities (16.45%), and transportation and service corridors (2.59%). There were no documented wetland impacts for agricultural land use, or energy production and mining for this time period. Locations of the permitted stream and wetland impacts are provided in **Figure 32**.

Work Type Category	Authorized Stream Impacts Linear Ft	Percent of Stream Impact per Category	Authorized Wetland Impacts - Acres	Percent of Wetland Impact per Category
Agriculture	0	0.00%	0	0.00%
Dam	0	0.00%	0.375	16.45%
Development	0	0.00%	1.846	80.96%
Energy Production	0	0.00%	0	0.00%
Transportation	1430	100.00%	0.059	2.59%
Grand Total	**1430**	**100.00%**	**2.28**	**100.00%**

Table 28. Authorized 404 stream and wetland impacts requiring mitigation by work type category, 2009 – 2015. Source: USACE Louisville, Detroit and Chicago Districts

St. Joseph River Service Area

404 Permitted Aquatic Resource Impacts Requiring Mitigation

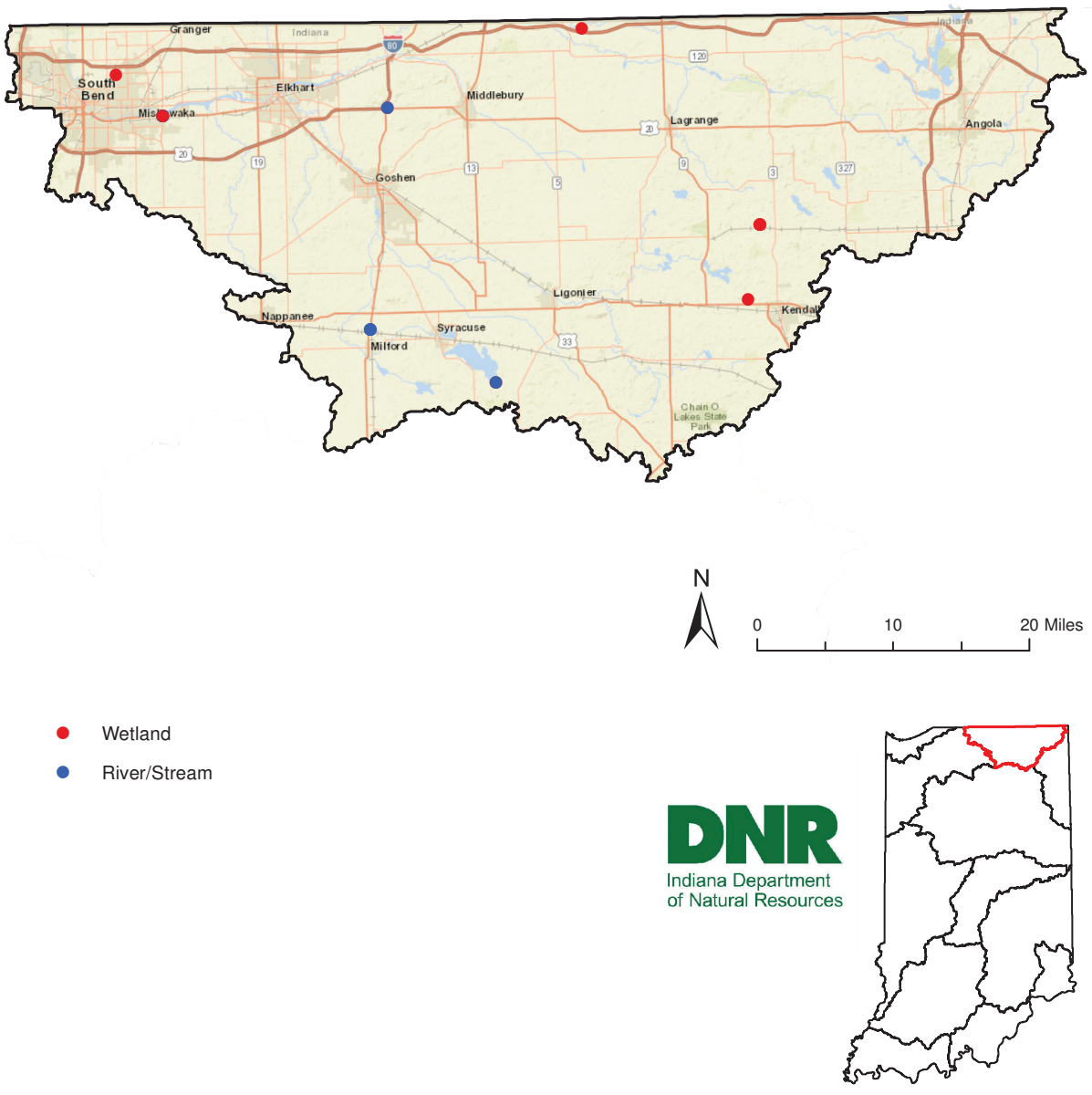

Figure 32. 404 permitted stream and wetland impacts requiring mitigation 2009-2015

2.2 Land Cover and Land Use

In addition to 404 permitted work type categories, IDNR utilized the 2011 NLCD (Homer, et al., 2015) to identify land cover and land uses that contribute to aquatic resource and habitat impacts. Overall land cover within the St. Joseph River SA is presented in **Figure 33,** and displays the geographical relationship of converted cover types relative to naturally occurring cover types.

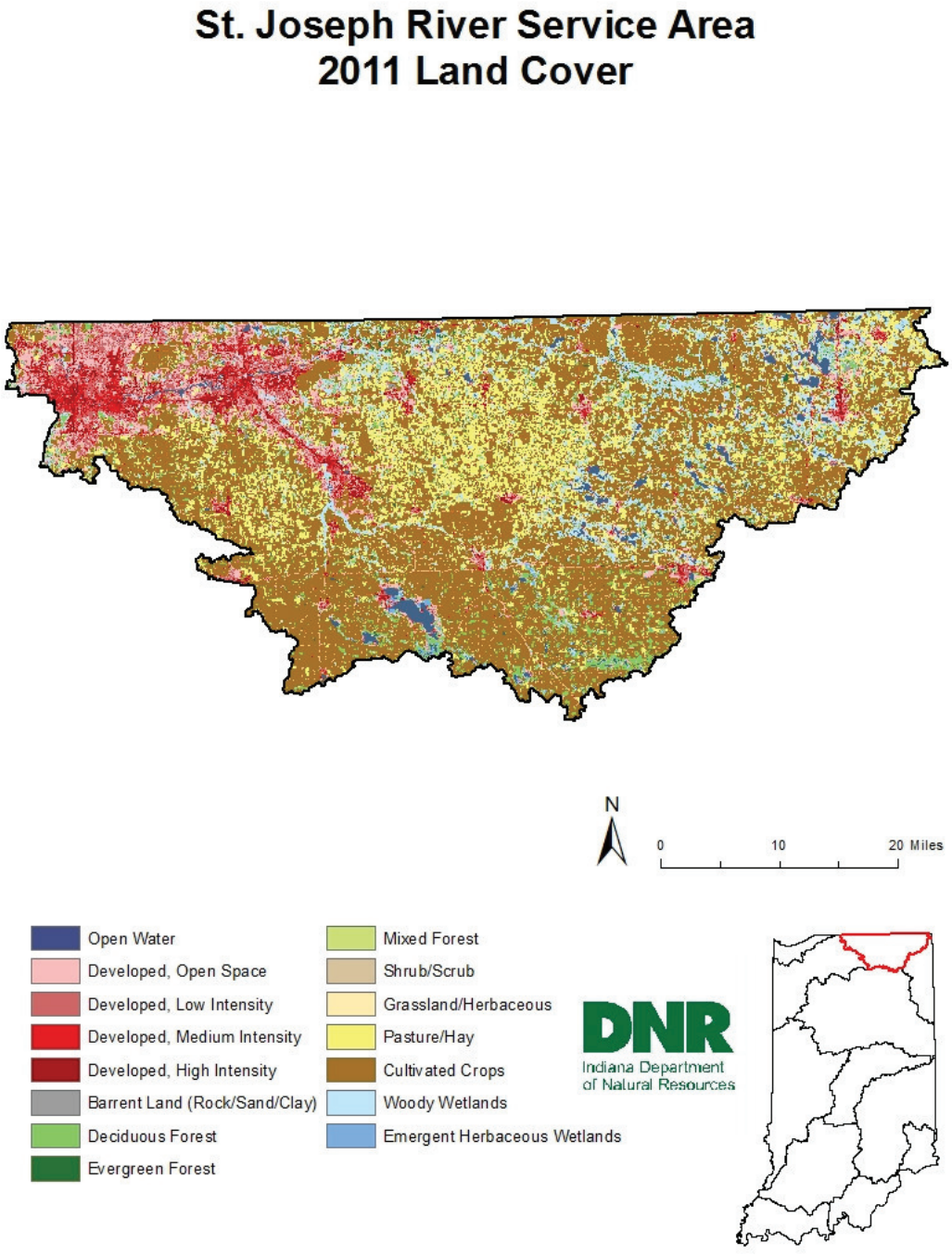

Figure 33. Land cover within the St. Joseph River Service Area from 2011 NLCD (Homer, et al., 2015)

The land uses exhibited within the 2011 NLCD include multiple classes of cover, and some have additional values within specific classes based on variants or intensities within the classification **(Table 29)**.

St. Joseph River SA Land Cover			
Class	**Value**	**Sum of Acres**	**Percent of Total Acres**
Open Water	*	25,397	2.34%
Developed	Open Space	91,242	8.39%
Developed	Low Intensity	69,505	6.39%
Developed	Medium Intensity	28,725	2.64%
Developed	High Intensity	15,207	1.40%
Barren Land (Rock/Sand Clay)	*	1,872	0.17%
Forest	Deciduous	63,840	5.87%
Forest	Evergreen	3,603	0.33%
Forest	Mixed	287	0.03%
Shrub/Scrub	*	5,243	0.48%
Grassland/Herbaceous	*	6,186	0.57%
Pasture/Hay (Agriculture)	*	158,855	14.61%
Cultivated Crops (Agriculture)	*	502,648	46.23%
Wetlands	Woody	110,197	10.13%
Wetlands	Emergent Herbaceous	4,570	0.42%
	Grand Total	**1,087,375**	**100.00%**

Table 29: St. Joseph River land classification/value percentages from 2011 National Land Cover Database

* Class does not have additional values. (Homer, et al., 2015)

IDNR combined the values within the same land cover classification in **Figure 34** below to demonstrate the current overall land cover distribution of the SA.

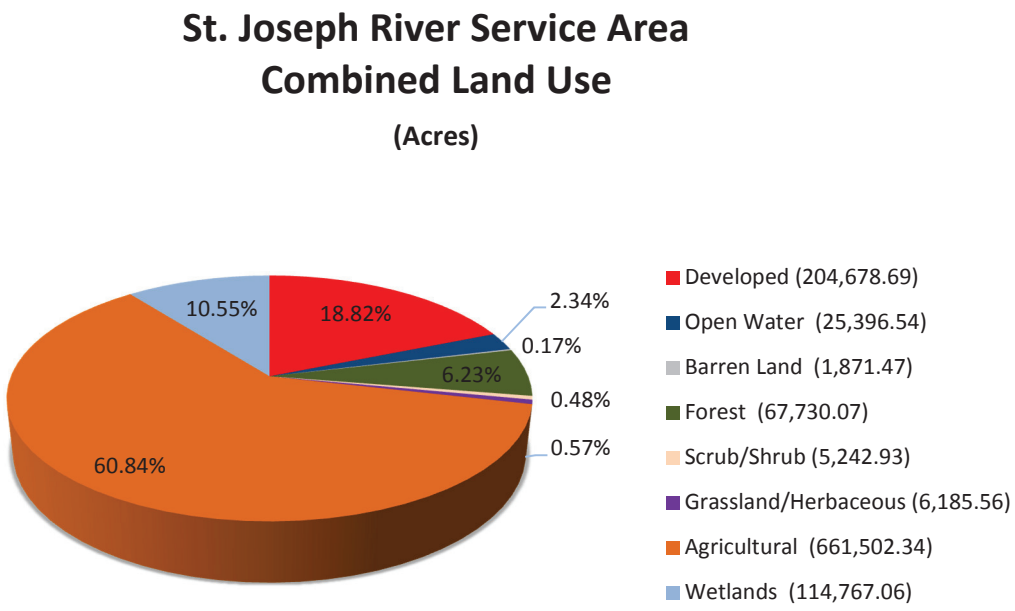

Figure 34. Combined land uses within the St. Joseph River SA from the 2011 NLCD (Homer, et al., 2015)

2.3 Agricultural Land Use

The 2011 NLCD demonstrates that the dominant land use in the St. Joseph River SA is agricultural comprising of approximately 661,502 (60.8%) of the SA's 1,087,375 total acres (Homer, et al., 2015). With the exception of the northwestern region that contains the South Bend/Mishawaka region, the St. Joseph River SA agricultural landscape is predominant throughout the remainder of the SA.

Within the agricultural land use areas, cultivated crops comprise 502,647 acres (46.23%) and pasture/hay lands cover 158,855 (14.61%) of the SA. Corn and soybean production are the primary cultivated crops within the SA, based on acres of harvested crops from counties that comprise the majority of the St. Joseph River SA boundary (United States Department of Agriculture, 2016 and 2017).

The pasture/hay lands support livestock production for small to major livestock farming operations within the SA. Both dairy cattle and pig farming have active confined feeding operations (CFOs), which require a minimum of 5,000 animal units, identified within the counties that comprise the SA. These CFOs are considered the predominant livestock industry within the St. Joseph River SA (Thompson, 2008).

When combining these major agricultural land use activities, the St. Joseph River SA ranks eighth in percentage of total statewide land use (2.86%), but it is the most significant land use within the SA.

2.4 Growth and Development

Developed impervious area is the second largest land use category in the St. Joseph River SA covering approximately 204,679 (19%) of the 1,087,375 total acres, which is the third highest developed area density of any SA.

In general, urban/suburban development and their associated impervious areas are most concentrated in the northwestern portion of the SA, consisting of communities such as South Bend, Mishawaka, Elkhart and Goshen; though smaller footprints of high intensity development occur in areas such as Albion, Angola, Kendallville, Syracuse and Middlebury. The SA contains part of the South Bend-Mishawaka MSA, the fourth largest in the state with a 2010 population of 319,224 (Manns, 2013). Approximately 40% (118,016 acres) of St. Joseph County's 295,283 acres fall within the St. Joseph River SA, accounting for approximately 11% of the SA's total acres.

The SA also contains the majority of the Elkhart-Goshen MSA, the eighth largest MSA in the state with a 2010 population of 197,559 (Manns, 2013). Approximately 98% (293,530 acres) of Elkhart County's 299,520 acres fall within the St. Joseph River SA, accounting for approximately 27% of total SA acres. Together, the portions of St. Joseph and Elkhart Counties within the SA account for 38% of total area, and approximately 53% of total developed land.

Three Indiana regional councils overlap with the SA and include the Region III-A Economic Development District and Regional Planning Commission (56%), Michiana Area Council of Governments (44%), and the Northeastern Indiana Regional Coordinating Council (1%) (IARC, 2017). Analysis of the INDOT cities and towns GIS data shows the St. Joseph River SA contains all or part of 85 cities and/or towns, 29 of which are incorporated (INDOT, 2016).

According to the Michiana Area Council of Governments (St. Joseph, Elkhart, and Kosciusko Counties within SA), over a third of this region's employment is in the manufacturing industry with exception of St. Joseph County (16%) where the educational services, health care, and social assistance sectors have the highest number of jobs (MACOG, 2014). This region experienced higher than average job loss as a result of the 2008 economic downturn, but has also been recovering with higher job growth than other areas in Indiana since this time, with an increase of 10% in the region, and 22% within Elkhart County alone (MACOG, 2015).

Additionally, analysis of INDOT's local roads GIS data shows there are approximately 6,658 miles of municipal and county roads contributing to the developed impervious land cover within the SA (INDOT Road Inventory Section, 2016). The St. Joseph River SA has the third highest local road miles to square mile ratio of the SA's at approximately 3.92 miles of local roads per square mile.

2.5 Transportation and Service Corridors

2.5.1 Roads

According to INDOT GIS analysis of U.S. interstates and highways, state highways and local roads, there are approximately 1,052 miles of U.S. interstates and highways, 825 miles of state roads, and 6,658 miles of local roads within the St. Joseph River SA (INDOT Road Inventory Section, 2016). Based on the SA's size and overall concentration of roads per square mile of land, which ranks it in the top three, the overall concentration of roads is considerable.

U.S. Interstates and highways have a concentration of approximately 0.62 miles per square mile and local roads have a concentration of 3.92 miles per square mile, which ranks both categories third of the eleven SAs. The density of state highways is tied for seventh of the eleven SAs with 0.49 miles of state highways per square mile.

The St. Joseph River SA ranks third in the highest density of roadways, when comparing the combination of all three road types from all other SAs. The construction and maintenance of roads and bridges support the predominant mode of transportation and play an integral role in sustaining business and commerce throughout the region.

2.5.2 Railroads

Railroads provide an alternative means of transportation with approximately 375 miles of railroad within the St. Joseph River SA (Federal Railroad Administration, 2002). These active railroads provide an important means of transportation for freight and passengers within the SA and state. The concentration of railroads, within the St. Joseph River SA, ranks the sixth greatest with a density of 0.22 miles of railroad per square mile. The concentration of linear infrastructure throughout the SA has resulted in aquatic resource impacts reducing their functions and services due to habitat conversion, fragmentation, and loss associated with the construction and maintenance of railroad rights-of-way.

2.5.3 Service Corridors

Similar to the threats associated with roads and railroads, the St. Joseph River SA contains service corridors, which fragment habitats within the SA. The SA contains over 1,411 miles of service corridors within its boundary.

This SA contains an extensive network of large kilovolt (kV) electric transmission lines within its boundary. There are approximately seventy five (12 kV) lines, fifty four (34 kV) lines, seventeen (69 kV) lines, twenty six (138 kV) lines, and twenty six (345 kV) lines (Indiana Geological Survey, 2001). These lines extend over 635 miles throughout the SA, which is tied for the seventh highest concentration of electric transmission lines relative to the SA size; 0.37 mile of transmission line per square mile.

In addition to electric transmission lines, the St. Joseph River SA contains over 776 miles of pipelines in total (Indiana Geological Survey, 2002). It contains over 50 miles of pipelines that convey crude oil, 599

miles of pipelines that convey natural gas, and 127 miles of pipelines that convey refined petroleum products. When compared to other SAs throughout the state, the St. Joseph River SA contains the tenth greatest concentration of crude oil pipelines, sixth highest concentration of natural gas pipelines, and the seventh greatest concentration of refined product pipelines.

2.6 Dams and Non-Levee Embankments

There are currently 24 known low head dams within the SA (IDNR DOW, 2016), the fourth highest statewide total, but the second highest concentration with one low head dam per 71 square miles. Additionally, three of the 24 low head dams are located within state designated salmonid streams. There are currently 19 state regulated high head dams (IDNR DOW, 2016) documented within the SA at a density of one dam per 89 square miles, comprising 2% of documented high head dams statewide.

Per the NLE GIS analysis (IDNR, 2016), there are approximately 142,560 linear feet (27 miles) of NLE's mapped within the SA, averaging one mile of NLE per 63 square miles, the second to least concentration among all SA's. LaGrange and Steuben counties were not included in the NLE identification project since they were not declared disasters resulting from the 2008 severe weather events; therefore, the St. Joseph River SA has additional NLE's that have not yet been mapped as part of this effort. Approximately 22.5 miles of the currently identified NLE's are located within predominantly developed areas, indicating that many of the mapped NLE may be road and railroad beds, and/or berms along channelized/maintained waterways. The remaining NLE's are mapped in rural agricultural settings.

2.7 Energy Production and Mining

2.7.1 Natural Gas and Oil Production

The St. Joseph River SA contains some oil and gas production. The Indiana Geological Survey (IGS) identifies ten petroleum gas fields that include seven active gas wells; twenty-five abandon gas wells; two oil fields that include one oil and gas well and three abandon oil and gas wells within the St. Joseph River SA, with a combined statewide ranking of ninth for productive oil and natural gas fields (Indiana Geological Survey , 2015). Although the petroleum field rankings are near the bottom, the IGS petroleum well data identifies 152 dry wells, 243 stratigraphic wells, two abandon waste disposal wells and eight temporarily abandon wells within the SA boundary (Indiana Geological Survey, 2015).

2.7.2 Mineral Mining and Aggregates

The St. Joseph River SA contains active mineral mining operations that extract and produce aggregate commodities. Based on the Indiana Geological Survey (IGS) 2016 active Indiana industrial mineral production data, the SA contains twenty-four sand & gravel mining operations (Indiana Geological Survey, 2016). Relative to the St. Joseph River SA size, mineral mining in the SA ranks seventh in the state with twenty-four active operations.

2.7.3 Coal

The St. Joseph River SA does not have recoverable coal reserves and contains no active surface or underground coal mines.

2.8 Indiana State Wildlife Action Plan (SWAP) Identified Threats

The St. Joseph River SA is located entirely within the Indiana SWAP Great Lakes Planning Region. The SWAP identifies the most significant threats to habitats and SGCN within the Great Lakes Region as:

- Habitat conversion and loss
- Natural systems modification
- Invasive species
- Dams
- Fish passage
- Point and non-point source pollution
- Water management and use
- Housing and urban areas
- Commercial and industrial areas
- Agriculture, aquaculture, livestock
- Roads and service corridors
- Changing frequency, duration, and intensity of drought and floods

The SWAP Great Lakes Region has experienced loss in the majority of habitat types over the last decade mostly to urban development, which gained 6.2% in land cover (SWAP, 2015).

2.9 Anticipated Threats

The existing land uses within agricultural and developed impervious footprints make up 80% of the land use within the SA and are expected to remain as top contributors to aquatic resource impairments. The South Bend-Mishawaka and Elkhart-Goshen MSA's are anticipated to remain the most likely for continued growth and development with the most potential for increases in developed land use impairment sources, which together consist of approximately 53% of the developed acres within the SA.

The MACOG has implemented a transportation plan known as Michiana on the Move: 2040 Transportation Plan, which serves as a roadmap for addressing multimodal transportation needs in this region, both near and long term (MACOG, 2014). Plans for roads, highways and associated infrastructure primarily include road reconstructions, new road constructions, added travel lanes, intersection improvements, grade separations and lane configurations. The plan also identifies mass rail transit, freight, non-motorized transportation, bicycle and pedestrian facilities and intermodal connections, both locally within the region, and for the larger regional cities including Chicago, Indianapolis, Detroit, Toledo and Fort Wayne (MACOG, 2014).

With considerations of growth and economic vitality at the core, the plan models and anticipates growth and development in the region related to improved mobility. This region has continuously grown at varying rates over the last half century, and is projected to grow 10% or more by 2040. Preliminary analysis of considerations in the general framework of NEPA are also integrated into the

MACOG planning approach to identify “red flags” that transportation and development projects have the potential to impact such as infrastructure, mining and mineral exploration, hazardous materials concerns, water resources and historical resources (MACOG, 2014). This analysis will also benefit IN SWMP in identifying potential threats to aquatic resources and habitat, and may help in the landscape-watershed approach in identifying, prioritizing and addressing the most significant water quality problems within the SA.

IDNR anticipates that development along with transportation and service corridor projects, to remain the foremost permitted activities requiring mitigation for aquatic resource impacts if the 404 permitting trends of the past 7 years continue.

2.10 Offsets to Threats

IDNR will apply the same restoration, enhancement and/or preservation approaches to offsetting the predominant threats in the St. Joseph River SA that were stated in the statewide portion of the CPF. The SA goals and objectives further define the general types and locations of the aquatic resources IDNR will provide as compensatory mitigation based upon identified threats, historic loss and current conditions. See **Appendix C** for a summary of offsets per major anthropogenic category and a general matrix of offset measures for each of the predominant threats to aquatic resources throughout the SA and the state.

ELEMENT 3. HISTORIC AQUATIC RESOURCE LOSS

The St. Joseph River SA’s historic aquatic resources included a diverse mix of wetlands and natural lakes that was home to a diversity of fish and wildlife species. The predominant land cover throughout the SA was comprised of various deciduous forested communities. The first Europeans entered this region as early as 1675, by using the St. Joseph River as a means of travel to the northern territories; however, fur traders established permanent settlements in South Bend due to the St. Joseph River’s rich wildlife (The History Museum, 2016). This as an avenue for passage to western territories, along with transportation routes that extended through the region, cemented European settlement within the region. South Bend was the largest settlement in the SA, which resulted in the conversion and permanent alteration of the landscape and aquatic resources. Growth during this time was correlated to the use of the region's rivers for trade and commerce circa 1800s. The proximity of South Bend settlement on the St. Joseph River provided the shortest portage to the Kankakee River, which ultimately allowed passage for traders to New Orleans via the Mississippi River from the Great Lakes region, or passage west for explorers (The History Museum, 2016).

As European expansion and trade routes were established, settlement continued to grow. This resulted in the exploitation of the region’s natural resources. The region’s ecosystems were fragmented, drained, cut, and cleared in order to facilitate growth and development that led to cumulative habitat destruction within the region (Nevers, Whitman, & Gerovac, 1999/2000). Forests

were harvested to accommodate farmland and the harvested trees provided materials for the region. Deforestation of the area also allowed for the establishment of industry and continued growth. Topeka, located in the central region of the SA, was transformed by this exploitation. Topeka was formally known as Slabtown because of all the sawmills in the region; however, in 1892 the establishment of the Wabash Railroad led to a name change and the establishment of a large stock yard that supported the shipment of livestock to the eastern US (Topeka Area Historical Society).

Shorelines of the natural lakes within the SA have been altered by humans throughout history, resulting in the loss of important lacustrine wetland areas. These alterations were caused by a variety of activities such as road construction and residential development. As a result of these alterations, natural areas have been fragmented and biodiversity has been significantly reduced. This decrease in diversity and productivity has ultimately caused a decrease in the health of aquatic ecosystems existing within lacustrine wetlands; human activities have proven to be primarily responsible for the degradation of plant communities, wildlife habitat, and water quality of these wetlands (Price, 2009).

In order to estimate aquatic resource loss within the SA, the understanding of the regions aquatic resources and the natural communities in which they existed is best reconstructed by evaluating the identified natural regions, and their aquatic communities. This SA is unique, when compared to the ten other SA's, because it is comprised of only one natural region, as identified within the Natural Regions of Indiana journal and depicted in **Figure 35**. In addition to the natural communities, the utilization of studies on Indiana's historic vegetative cover and mapped hydric and partially hydric soils provide further insight into the general location and makeup of the historic aquatic resources that existed prior to early European settlement **(Table 30)**. The table details the SA's estimated land cover percentage and identified natural communities, estimated hydric and partially hydric soils, and estimated forest cover.

Natural Region(s)	Natural Region: Section(s)		Natural Region Community Types	Hydric Soils		Partially Hydric		Pre-Settlement % Forest Cover
	Name	% Cover		Acres	% Cover	Acres	% Cover	% Forested
Northern Lakes	Northern Lakes	100	Bog, fen, marsh, prairie, sedge meadow, swamp, seep spring, lake (Wet sand flats and muck flats), and various deciduous forest types; Typical streams are clear, medium to low-gradient, sandy gravel beds	119,531	10.99	267,905	24.64	94.73

Table 30. The historic natural community composition for the St. Joseph River Service Area based upon the natural region and section

St. Joseph River Service Area
Natural Region

Figure 35. Natural regions and sections within the St. Joseph River Service Area (Homoya, Abrell, Aldrich, & Post, 1985)

ELEMENT 4. CURRENT AQUATIC RESOURCE CONDITIONS

4.1 Streams and Rivers

GIS analysis of 303(d) category 4A and 5 impaired streams (IDEM-IR, 2016) indicates there are currently 318 miles of category 4A impaired streams and 810 miles of category 5 impaired streams documented in the SA. IDEM reported E. coli (715 miles), impaired biotic communities (200 miles), dissolved oxygen (87 miles), PCB's in fish tissue (70 miles), nutrients (26 miles), ammonia (25 miles), and chloride (5 miles) as current stream impairments within the SA (IDEM-IR, 2016). There are stream reaches in which multiple impairments may occur; therefore there is some overlap with the impaired stream miles.

As of 2014, IDEM conducted QHEI assessments of 116 stream reaches within the SA **(Table 31 and Figure 36)** (IDEM OWQ, 2014). Though QHEI is intended for warm water communities, four (4) assessment reaches were conducted within salmonid streams which are also capable of supporting a salmonid fishery (such as put-and-take trout fishing) per the Indiana Water Quality Standards, 327 IAC 2-1-.5-5 (a)(3). Of the stream and river habitat reaches assessed, 42.2% are cable of supporting a balanced warm water community.

QHEI Score Ranges	Narrative Rating	Count	Percent of Total
<51	Poor Habitat	39	33.6
51-64	Habitat is partially supportive of a stream's aquatic life design	28	24.2
>64	Habitat is capable of supporting a balanced warm water community	49	42.2
	Total	**116**	**100%**

Table 31. IDEM overall QHEI scores for St. Joseph River SA, 1991-2014 (IDEM OWQ, 2014)

As previously discussed, the functions and services provided by forests are important to the ecological health of aquatic resources in all portions of the SA that were historically forested. Analysis of the 2011 NLCD indicates that the St. Joseph River SA ranks last overall in forested cover density of all SA's at 6% of total area with approximately 67,730 acres, and is the SA with the third least percentage of forested cover with approximately 1.3% of 5,215,169 acres of forest cover statewide.

GIS analysis indicates that there are approximately 1,220,086 linear feet (231 miles) of stream located within 100 feet of agricultural fields. Under these criteria, the St. Joseph River SA has the second lowest ratio of these potentially restorable stream miles to square miles of SA at approximately 0.14 mile of potential restoration per one square mile, or one mile of potential restoration for every 7.4 square miles of SA.

St. Joseph River Service Area
Qualitative Habitat Evaluation Index (QHEI) Scores

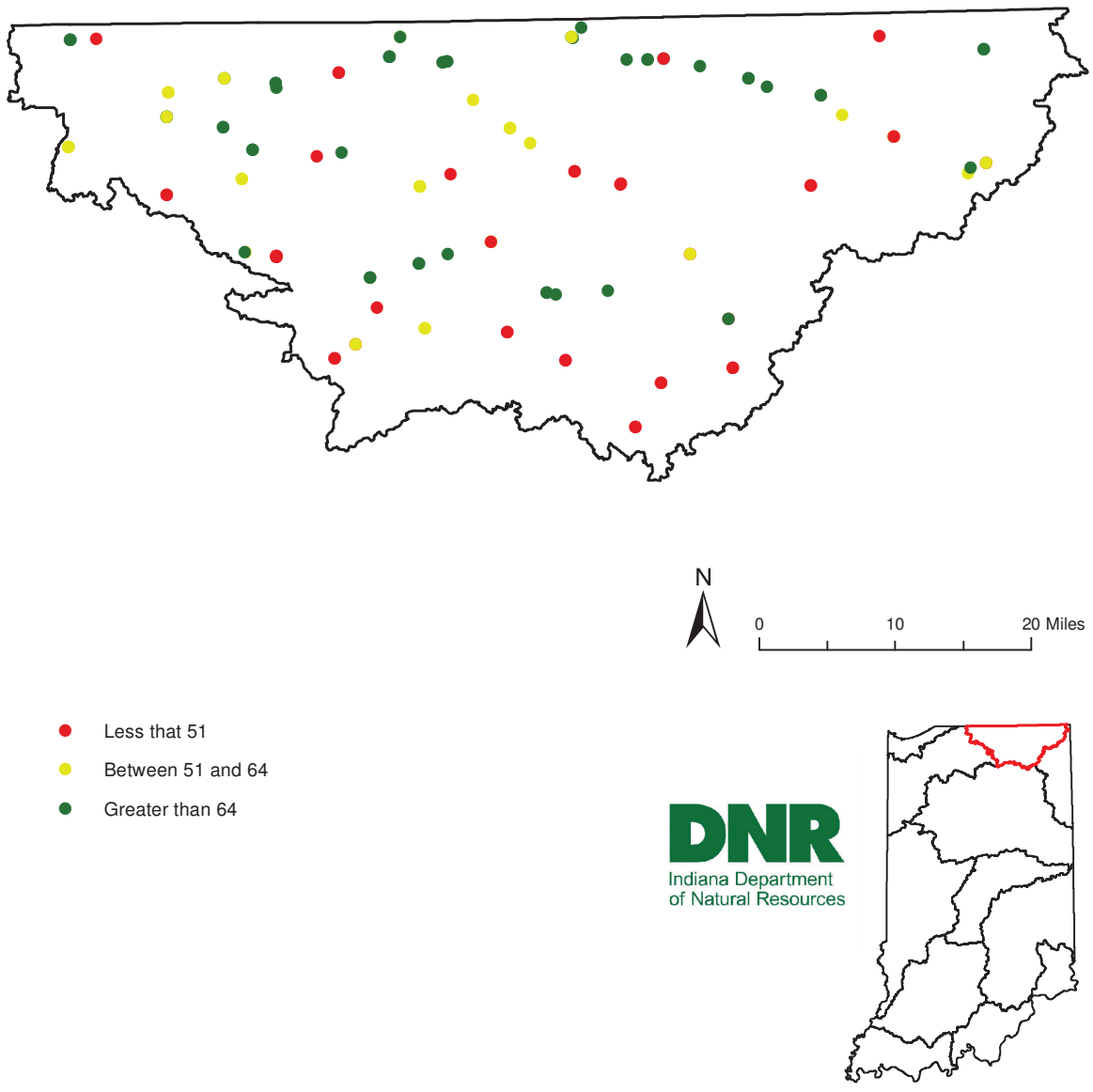

Figure 36. IDEM overall QHEI scores within the St. Joseph River SA; 1991 – 2014 (IDEM OWQ, 2014)

4.2 Wetlands

Analysis of the NWI in the St. Joseph River SA shows that there are approximately 26,661 acres of freshwater emergent wetland (PEM) and approximately 51,843 acres of combined freshwater forested (PFO) and scrub-shrub (PSS) wetlands, accounting for approximately 7.2% of the total SA acreage. All of the aquatic resource types from the NWI combined account for approximately 10% of the total SA **(Table 32** and **Figure 37)**. The St. Joseph River SA encompasses in part four Indiana counties containing the greatest densities of wetlands within the entire state; these counties are LaGrange, Steuben, Noble, and Kosciusko (IDNR, 1996). Among many wetland dependent wildlife species, the St. Joseph River watershed wetlands are home to many migratory birds and the federally-endangered Indiana Bat (DeGraves, 2005).

Aquatic Resource Type	Sum of NWI Aquatic Resource ACRES in SA	Percent of Total NWI Aquatic Resource Acres in SA	Percent of SA Total Acres	Percent of Total State Area –Acres
Freshwater Emergent Wetland	26,661.41	24.48%	2.45%	0.11%
Freshwater Forested/Shrub Wetland	51,843.16	47.61%	4.77%	0.22%
Freshwater Pond	6,596.40	6.06%	0.61%	0.03%
Lake	22,108.45	20.30%	2.03%	0.09%
Riverine	1,685.06	1.55%	0.15%	0.01%
Grand Total	**108,894.48**	**100.00%**	**10.01%**	**0.47%**

Table 32. Acres and percentage of acres of aquatic resource types from NWI analysis (USFWS NWI, 2015)

Hydric and partially hydric soils (NRCS-USDA, 2016) account for 241,835 acres (**Figure 38**), or 22% land cover within the SA, out of which approximately 178,657 acres have the potential to be restored, accounting for 16.4% of the total SA. This was determined by mapping current hydric and partially hydric soils data with potentially restorable land cover types (e.g., cropland, pasture), excluding PFO, PSS and PEM wetlands from the NWI within agricultural land use. The St. Joseph River SA ranks seventh among the SA's for both percentage of potentially recoverable wetland acres to total SA size and for total potentially restorable wetland acreage statewide.

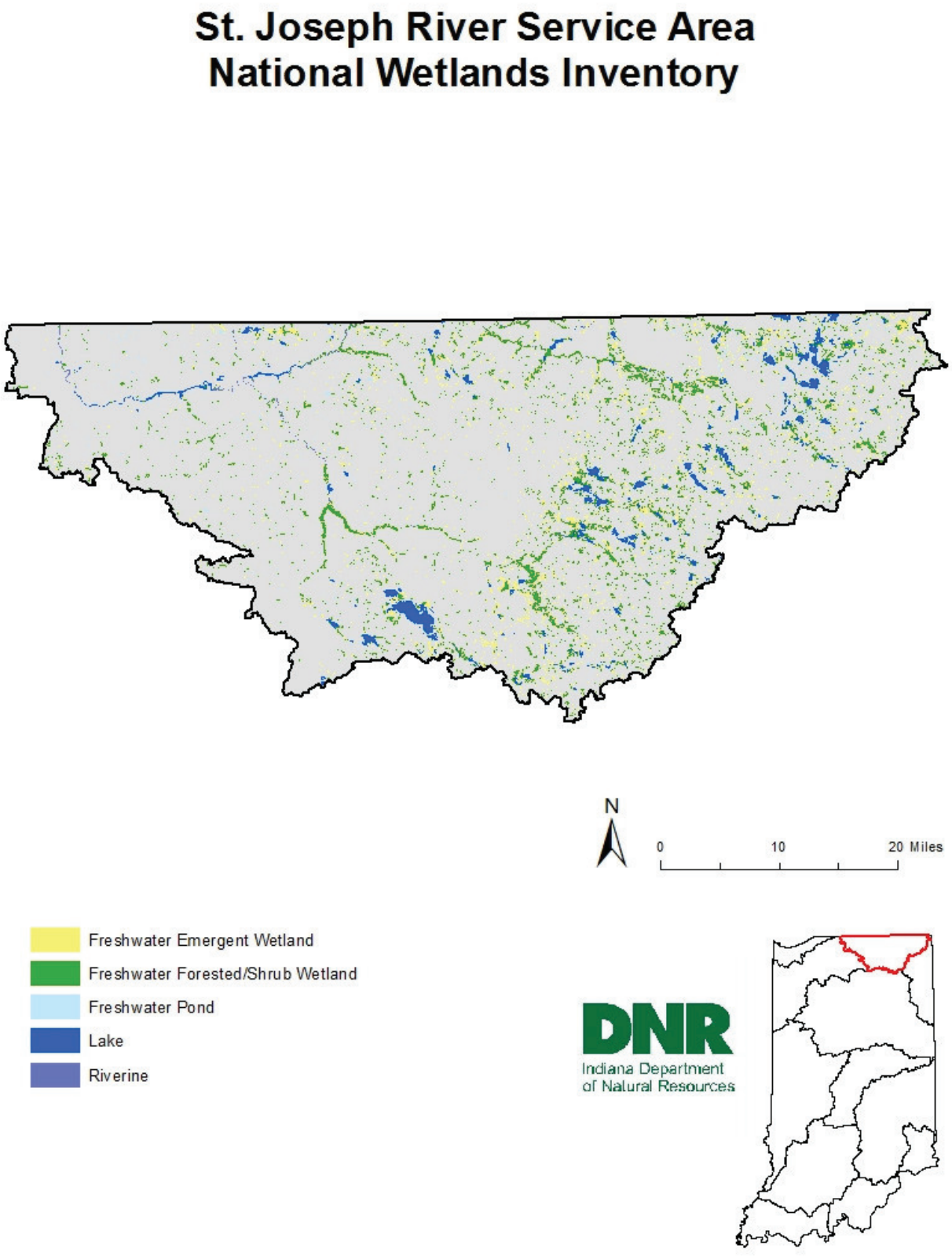

Figure 37. NWI within the St. Joseph River Service Area (USFWS NWI, 2015)

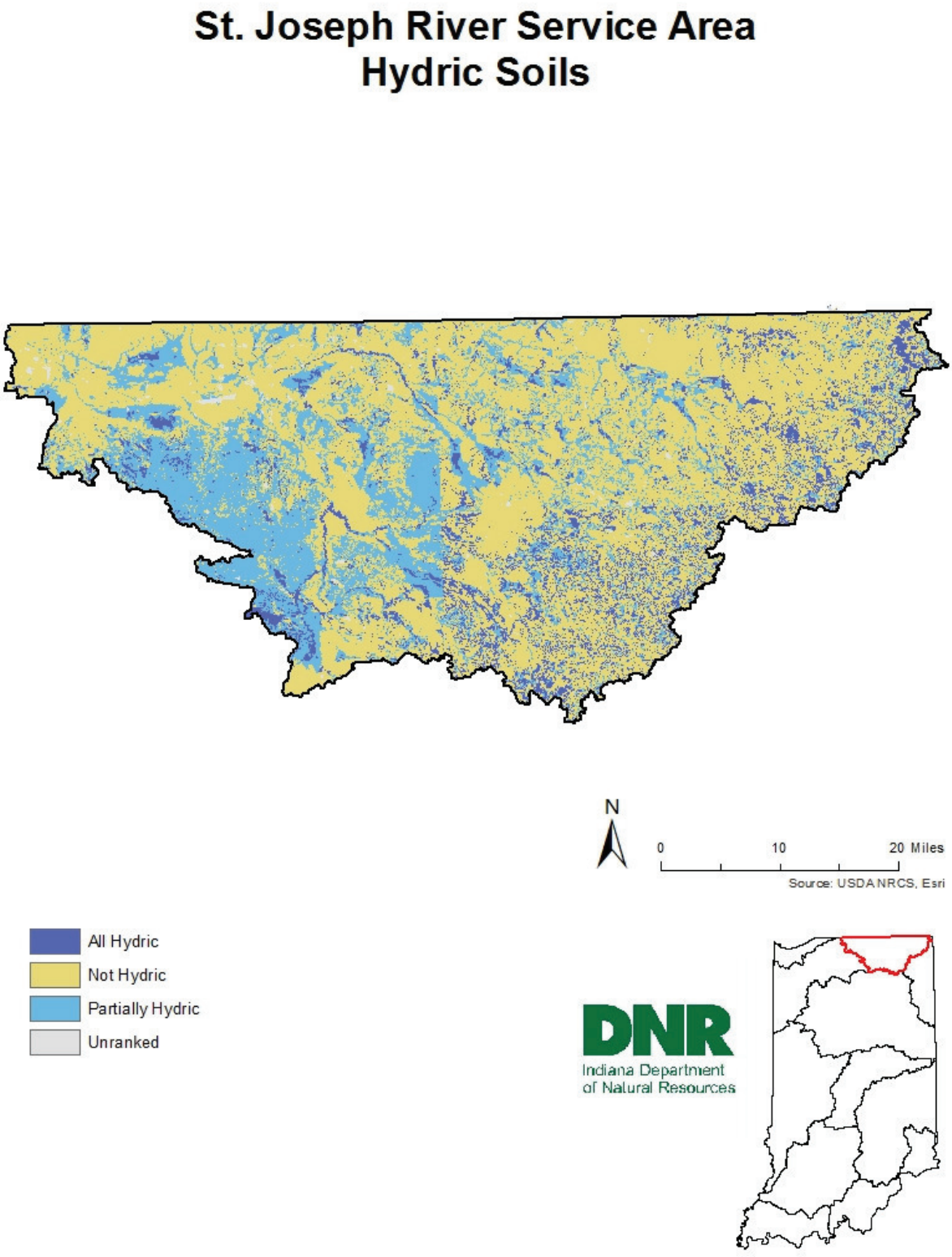

Figure 38. Hydric and partially hydric soils within the St. Joseph River SA (NRCS-USDA, 2016)

4.3 Concentrations of Potentially Restorable Wetlands and Streams

GIS hotspot analysis was conducted to document concentrations of the identified potentially restorable wetlands and streams. Hotspots account for 109,756 acres of potentially restorable wetlands within the SA. The watershed with the most hotspots of potentially restorable wetlands is Wisler Ditch-Baugo Creek (HUC 040500012102 **[Table 33)**.

Hotspots account for 467,444 linear feet of potentially restorable streams within the SA. The watershed with the most hotspots of potentially restorable streams is Village Lake-Turkey Creek (HUC 040500011701 **[Table 34)**. The watersheds with the highest concentrations of potentially restorable streams and wetlands **(Tables 33 & 34)** serve as the basis for identification of areas that have experienced the most recoverable aquatic resource loss within the SA. **Figure 39** shows where these watersheds are located within the SA.

HUC 12 Code	HUC 12 Name	Hotspots of Potentially Restorable Wetlands (acres)
040500012102	Wisler Ditch-Baugo Creek	10,585
040500011707	Omar Neff Ditch-Turkey Creek	9,815
040500011708	Dausman Ditch-Turkey Creek	8,555
040500012101	Grimes Ditch	8,216
040500011706	Berlin Court Ditch	7,353

Table 33. Watersheds in the St. Joseph River (Lake Michigan) Service Area with the most hotspots of potentially restorable wetlands

HUC 12 Code	HUC 12 Name	Hotspots of Potentially Restorable Streams (linear feet)
040500011701	Village Lake-Turkey Creek	32,216
040500011708	Dausman Ditch-Turkey Creek	29,434
040500011901	Hoover Ditch-Rock Run Creek	24,699
040500011803	Headwaters Solomon Creek	24,273
040500011709	Pine Creek	18,295

Table 34. Watersheds in the St. Joseph River (Lake Michigan) Service Area with the most hotspots of potentially restorable streams

St. Joseph River Service Area

Concentrations of Potentially Restorable Streams and Wetlands

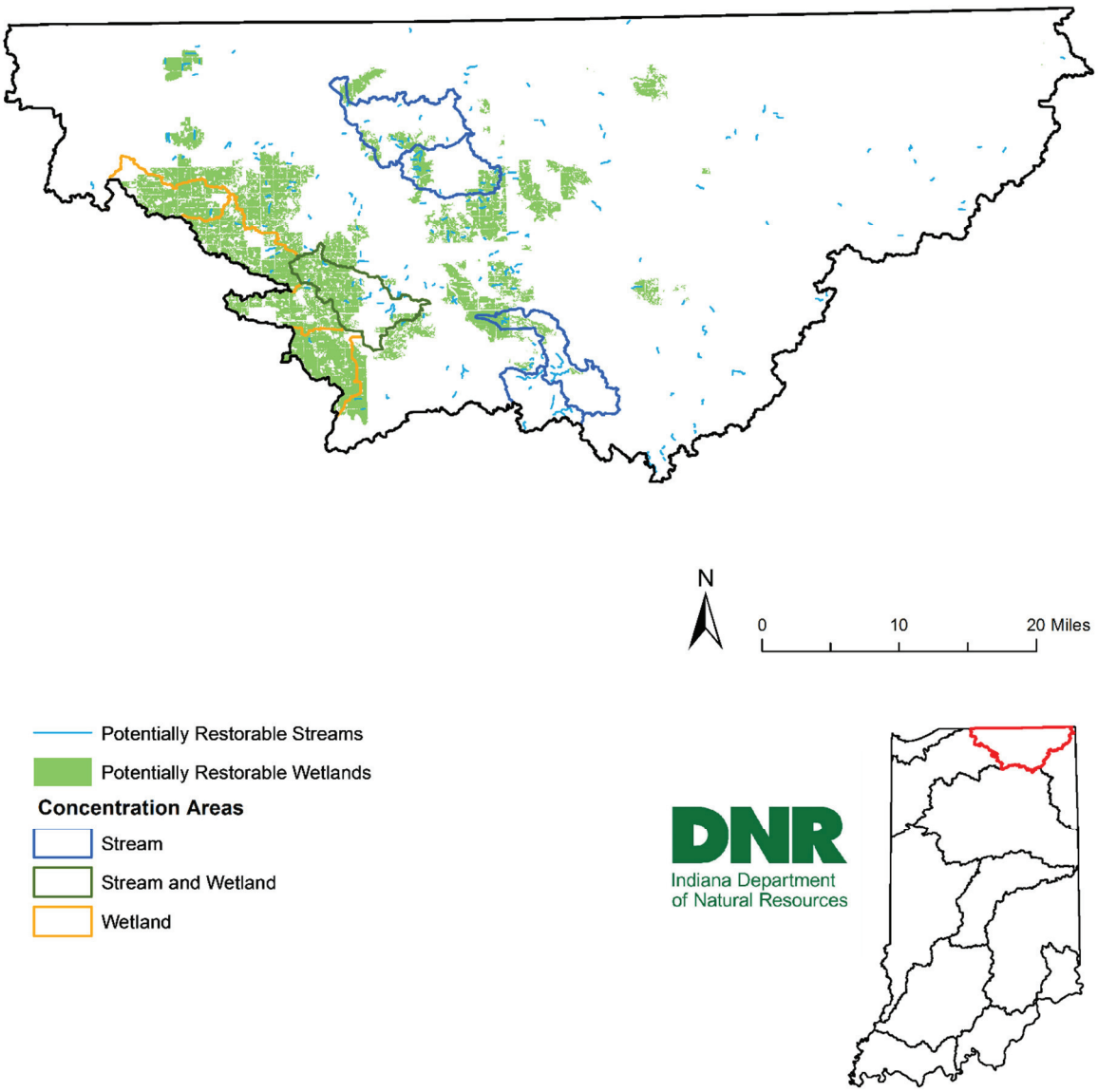

Figure 39. Concentrations of Potentially Restorable Streams and Wetlands in the St. Joseph River Service Area

4.4 Lakes, Reservoirs and Ponds

GIS analysis of 303(d) lake impairments (IDEM-IR, 2016) in the SA indicates there are 47 lakes currently documented having category 5 impairments, which measured using the National Hydrography Dataset (NHD), includes 5,266 acres with PCBs in fish tissue, 1,778 acres of impaired biotic communities, 502 acres with phosphorus, and 383 acres total mercury in fish tissue.

Shorelines of the natural lakes within the SA have been altered by humans throughout history, resulting in the loss of important lacustrine wetland areas. These alterations were caused by a variety of activities such as road construction and residential development. As a result of these alterations, natural areas have been fragmented and biodiversity has been significantly reduced. This decrease in diversity and productivity has ultimately caused a decrease in the health of aquatic ecosystems existing within lacustrine wetlands; human activities have proven to be primarily responsible for the degradation of plant communities, wildlife habitat, and water quality of these wetlands (Price, 2009).

The 2011 NLCD identifies approximately 25,397 acres of open water which accounts for 2.34% of the SA. This varies slightly from the NWI, which identifies approximately 6,596 acres of freshwater pond comprising 0.6% of the SA, and 22,108 acres of lakes comprising 2% of total SA acres. Of these open waterbodies, GIS analysis identifies approximately 221 natural public freshwater lakes (PFL) (IC 14-26-2-1.5) within the SA, which is 52% of all PFL's as identified by the Indiana Natural Resource Commission list of public freshwater lakes (IN NRC, 2011). Furthermore, GIS analysis indicates that approximately 8,652 acres of PFO, PSS and/or PEM from the NWI are contiguous with the boundary of PFL's as identified in the DNR DOW's GIS data within the SA. IDNR will remain up to date with PFL and reservoir condition data from sources such as IDEM, the Indiana Clean Lakes Program, watershed management plans, lake associations and the like as the landscape watershed approach is utilized to identify aquatic resource needs within the SA.

4.5 Ground Water and Surface Water Interaction

The data presented in this section will help identify potential areas in need of increased ground water recharge and/or identifying sensitive aquifers in need of increased buffering and protection from potential contamination threats.

Analysis of the near surface aquifer recharge rate data from IGS (Letsinger S. L., 2015) for the St. Joseph River SA shows that approximately 99% of shallow unconsolidated aquifers in this SA receive between 4 to 11 inches of recharge per year **(Table 35).**

Recharge Rate	Inches/Year	Square Miles	Percent of Calumet-Dunes SA
High	14	1.2	0.07%
	13	2.2	0.13%
	12	6.0	0.36%
	11	27.2	1.60%
	10	130.1	7.67%
	9	362.7	21.38%
	8	370.6	21.85%
	7	337.8	19.91%
	6	249.1	14.69%
	5	141.5	8.34%
	4	55.7	3.28%
	3	9.7	0.57%
Low	2	1.0	0.06%
	1>	1.5	0.09%

Table 35. Approximate annual ground water recharge rates in the St. Joseph River Service Area (Letsinger S. L., 2015)

Analysis of the IGS near surface aquifer sensitivity mapping (Letsinger S. , 2015) indicates that approximately 99% of the St. Joseph River SA near surface aquifers are in the moderate to very high range for sensitivity to contamination **(Table 36)**. This reflects the middle to high aquifer recharge rates in the SA.

Sensitivity	Square Miles	Percent of Total Acres
Very High	253	15.22%
High	1,186	71.27%
Moderate	203	12.22%
Low	20	1.23%
Very Low	1	0.06%

Table 36. Ground water sensitivity distribution in the St. Joseph River Service Area (Letsinger S. , 2015)

Analysis of the IDNR Division of Water's Water Rights Section 2015 significant water withdrawal facilities data (IDNR DOW, 2016) shows the St. Joseph River SA the second least registered capacity of surface water withdrawal of any SA, with a 2015 registered surface water withdrawal capacity of 11,806 million gallons a day (MGD) **(Figure 40)**. The energy production sector accounts for approximately 70% of registered withdrawal capacity followed by industry and agricultural irrigation, both at approximately 11% each of total registered capacity.

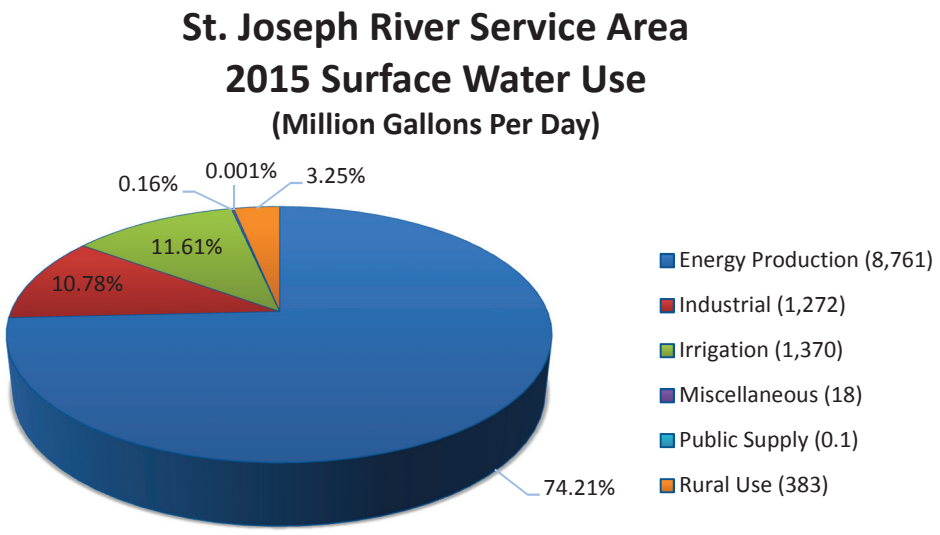

Figure 40. Significant Water Withdrawal Facilities-Surface Water (IDNR DOW, 2016)

Significant ground water withdrawal in the St. Joseph River SA is the fourth most of any SA with 25,978 MGD registered capacity **(Figure 41)** (IDNR DOW, 2016)**.** Public water supply and agricultural irrigation combined account for approximately 83% of registered ground water withdrawal capacity in the SA.

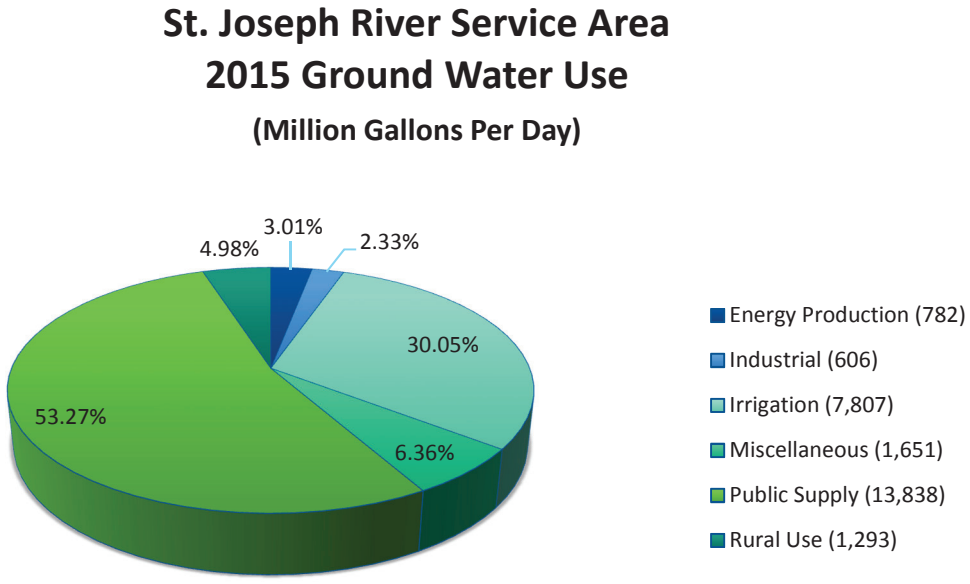

Figure 41. Significant Water Withdrawal Facilities-Ground Water (IDNR DOW, 2016)

4.6 High Quality Aquatic Resources and Natural Communities

Analysis of the DNR salmonid stream GIS dataset indicates there are approximately 331,990 linear feet (63 miles) of salmonid streams in the St. Joseph River SA.

In addition to previous eco and natural region descriptions of this SA, other high quality natural communities currently documented in the Natural Heritage Database within the St. Joseph River SA include, but are not limited to acid bog, circumneutral bog, forested swamp, shrub swamp, fen, forested fen, marl beach, muck flat, wet floodplain forest, marsh, and sedge meadow, in addition to quality transitional, mixed and upland communities.

There are currently five amphibian species, 47 bird species, ten fish species, 11 mammal species, eight mollusk species, and nine reptile species listed as SGCN within the Indiana SWAP Great Lakes Planning Region (SWAP, 2015) which also includes the Calumet-Dunes and Maumee SAs.

ELEMENT 5. AQUATIC RESOURCE GOALS AND OBJECTIVES

Aquatic resource goals and objectives identified in the statewide CPF also apply to the St. Joseph River SA. The following aquatic resource goals and objectives apply specifically to the St. Joseph River SA based on 404 permitted impact trends, predominant threats, historic loss, current impaired and high quality aquatic resource conditions, habitats and SGCN, and current and future priority conservation areas. The general amounts of aquatic resources IDNR will seek to provide will depend on ILF credit demand.

1. Restoration of riparian and lacustrine wetlands to help offset threats to, and improve functions and services of, aquatic resources that will improve connectivity of formerly extensive wetland and natural lake complexes throughout the SA that have been degraded by, and/or lost to conversion.
2. Re-establishment of historic aquatic resources that have experienced high concentrations of loss, fragmentation, and/or impairment, such as the identified concentrations of potentially restorable streams and wetlands to include any channel restoration needs.
3. Implement projects within and adjacent to current and future areas identified as conservation priorities by federal, state and local government entities, and non-governmental organizations (stakeholder involvement/conservation partnerships).
4. Restoration of in-stream habitat, structural integrity and riparian cover of salmonid streams critical to SGCN and salmonid species to include potential removal or modification of dams.
5. Support critical habitat restoration for federal and state listed SGCN within and adjacent to aquatic resources while applying SWAP identified conservation needs and actions in the Great Lakes Planning Region where feasible.
6. Restoration, enhancement and/or preservation of aquatic resources that will offset threats from growth and development, agricultural land use, and transportation and service corridors as well as anticipated threats within the SA.
7. Implement stream and wetland restoration, enhancement and/or preservation projects to help improve watershed functions and services contributing to gains in Lake Michigan water quality, and

preserve and buffer high quality threatened habitats unique to the Great Lakes Region that are not yet protected such as those identified in the Great Lakes Restoration Initiative.
8. Target stream, riparian and wetland restoration, enhancement and/or preservation projects in urbanized areas acknowledging the challenges and constraints that will likely occur within intensely developed areas in this SA.
9. Preservation of rare and high quality aquatic resources; critical habitat for rare and endangered species; priority habitat for species of greatest conservation concern; and/or other areas meeting the requirements of 33 CFR §332.3(h).
10. Implement natural stream channel restorations in order to help offset chemical, physical and biological impairments and degradation resulting from anthropogenic activities.
11. Restoration of migratory bird aquatic habitat as identified in the Great Lakes Restoration Initiative and/or other applicable initiatives or studies.

ELEMENT 6. PRIORITIZATION STRATEGY

The four steps below present the prioritization criteria for mitigation site identification and selection. This prioritization strategy will be used for project selection within each SA. When prioritizing sites for mitigation projects, the following **core criteria** shall be utilized.

1. Mitigation site proposals must contain the ability to result in a successful and sustainable net gain and/or preservation of aquatic resource functions and services and/or result in no net loss of Indiana's aquatic resources.
2. Prioritization will be given to compensatory mitigation projects that provide the greatest benefit to the St. Joseph River SA, by providing the greatest lift in aquatic resource functions and services based upon the specific needs identified within the SA and/or watershed utilizing the watershed approach for site selection.
3. Project proposals will consider how to offset the anthropogenic threats to aquatic resources, historic loss, and existing and future impairments while achieving IN SWMP goals and objectives, within the SA.
4. Other prioritization evaluation criteria may include, but are not limited to; cost, feasibility, size, proximity to other conservation lands or protected areas, connectivity or location with respect to corridors, human use value, and efficient long term maintenance.

In addition to the Core Criteria, information from conservation partners, landowners and additional stakeholders may also be utilized during the site selection process as they may have additional data or a pre-existing list of priority restoration projects. Ground investigations will be required to confirm or dismiss these datasets and determine the best locations for compensatory mitigation project sites.

Currently, the following watershed plans exist within the SA: Baugo Creek WMP, St. Joseph River (MI) WMP, Elkhart River WMP, Elkhart River-Yellow Creek (lower) WMP, Five Lakes Area WMP, Little Elkhart River WMP, Pigeon Creek WMP, and Puterbaugh Creek-Heaton Lake WMP. However, IDNR will utilize the most current watershed planning information that is available as these plans are updated and/or new watershed plans are developed within this SA over the life of the program.

ELEMENT 7. PRESERVATION OBJECTIVES

When applicable under 33 CFR §332.3(h) of the Federal Mitigation Rule, preservation objectives within the St. Joseph River SA will permanently protect rare aquatic habitats, high quality natural aquatic and riparian communities, and waters having a significant contribution to ecological sustainability and important habitat for SGCN, while addressing the important physical, chemical, or biological functions provided to the watershed that address critical conservation needs throughout the service area. Additionally, there will likely be aquatic resource and habitat preservation and/or enhancement opportunities in coincidence with the primary objective of restoration to be determined on a per project basis and approved by the Corps/IRT.

ELEMENT 8. PUBLIC AND PRIVATE STAKEHOLDER INVOLVEMENT

Currently, the following land trusts exist within the SA: Trillium Land Conservancy, Wood-Land-Lakes RC&D Council, Clear Lakes Township Land Conservancy, Blue Heron Ministries, Wawasee Area Conservation Fund, and ACRES Land Trust. There is the potential for land trusts to dissolve, adjust their geographical boundaries, and for new land trust organizations to be created within the SA. IDNR intends to partner with land trusts that exist in the SA on compensatory mitigation projects to develop project plans and designs as well as providing long-term management and stewardship of subject properties over the life of the program.

Coordination with the St. Joseph River Basin Commission (SJRBC) for mitigation projects within the St. Joseph River SA will also be pursued. The SJRBC has completed the following watershed plans in the SA: Baugo Creek-Wisler Ditch, Elkhart River, Hesston-Stock Ditch Headwaters (including Pleasant and Riddles Lakes), Juday Creek, Little Elkhart River, Pigeon Creek, and Pigeon River.

Additional stakeholders' interest and potential conservation partnerships specific to the St. Joseph SA, and in which IIDNR is an interested party, include, but are not limited to the following organizations and/or initiatives:

- St. Joseph River Basin Commission
- Municipal and County governmental entities
- Active Watershed Groups and appropriate Watershed Management Plans
- County Soil and Water Conservation Districts and the Indiana Association of SWCD's (IASWCD)
- Upper Midwest and Great Lakes, and Eastern Tallgrass Prairie and Big Rivers Landscape Conservation Cooperatives
- Michigan state and local level governmental entities
- Local and Great Lakes region academic institutions
- USGS Great Lakes Science Center
- USGS Indiana Water Science Center
- USGS Michigan Water Science Center
- Friends of the St. Joe River (FotSJR), Indiana and Michigan

- Michiana Area Council of Governments
- Region III-A Economic Development District and Regional Planning Commission
- Northeastern Indiana Regional Coordinating Council
- Municipal Separate Storm Sewer Systems (MS4) Communities
- Steuben County Lakes Council
- Lake and/or Property Owner Associations
- Indiana Lakes Management Society
- Wawasee Area Conservancy Foundation

Some currently known public, private and non-profit conservation priority areas as identified by the 2015 IWPP (IWPP, 2015) are shown in **Figure 42** below.

In order to target wetland protection and restoration efforts in areas with the most significant water quality benefit potential in the St. Joseph River watershed, the Friends of the St. Joe River Association with support from the U.S. EPA and the assistance of the Michigan Department of Environmental Quality (MDEQ) performed a GIS based Landscape Level Wetland Functional Assessment (LLWFA) which classifies existing and historic wetlands based on existing and/or potential functional value. The assessment included water quality functions such as floodwater storage, sediment retention, nutrient transformation and shoreline stabilization. Information about the methodology for the LLWFA and how it can be used to prioritize wetlands for protection and restoration can be found in a related report, *Paw Paw & Black Rivers Wetland Protection & Restoration Project*, for a sub-watershed of the St. Joseph River in Michigan, which was conducted by the Van Buren Conservation District with grant support from the MDEQ (Van Buren CD, 2013).

The 2015 Indiana Wetlands Program Plan recognizes this LLWFA as a robust wetland mapping tool for locating and prioritizing existing and potentially restorable wetlands (IWPP, 2015). The extent of the study is shown in **Figure 43** below illustrating priority wetland restoration (restoration wetland ownership) and existing wetlands (current wetland ownership areas) identified as priority for protection. The study also identified property ownership for all priority restoration locations. This LLWFA will be useful as an additional tool to help identify and prioritize potential wetland restoration, enhancement and/or preservation opportunities in the St. Joseph River SA.

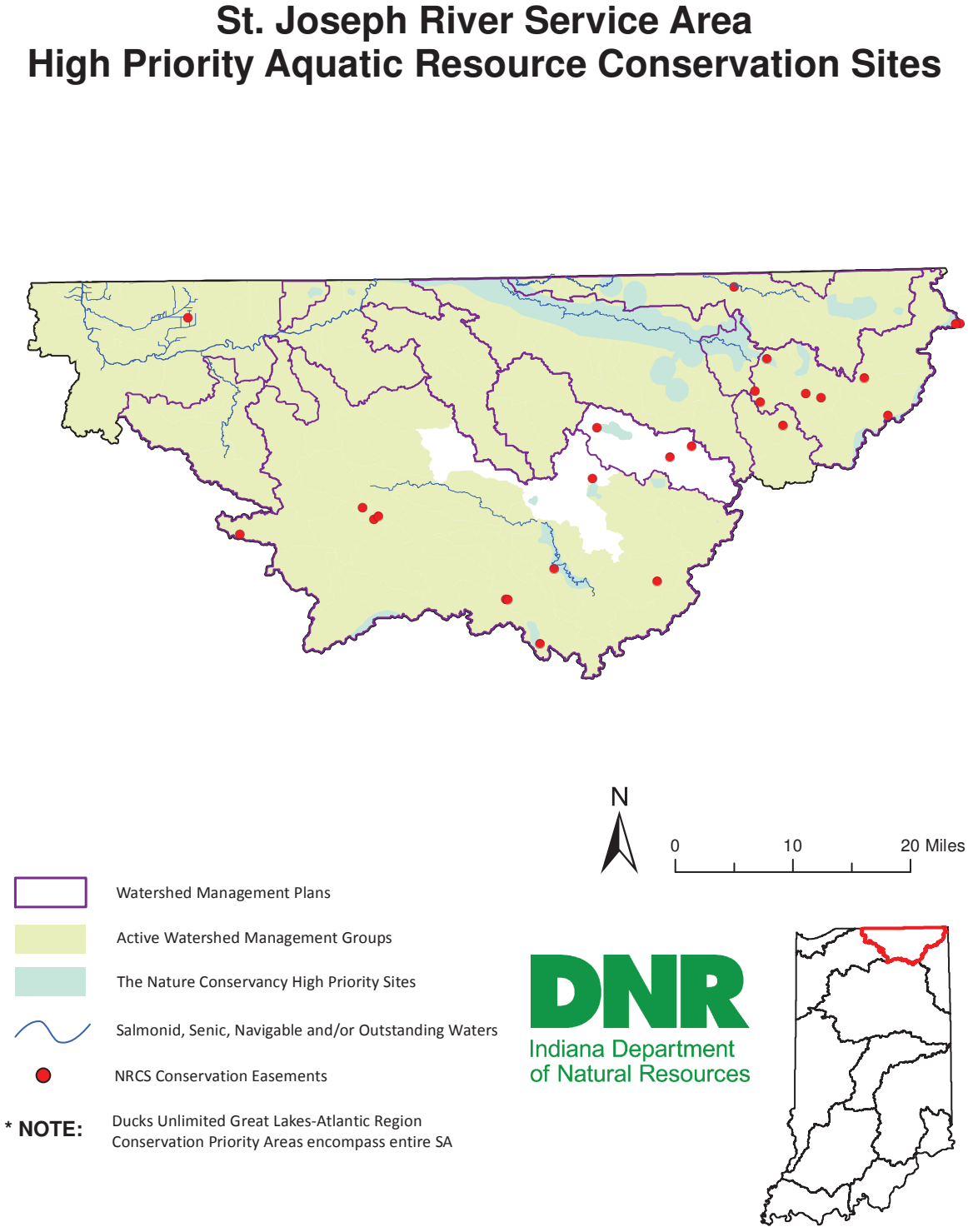

Figure 42. Priority conservation areas and sites within the St. Joseph SA; IDEM Wetland Program Plan (IWPP, 2015)

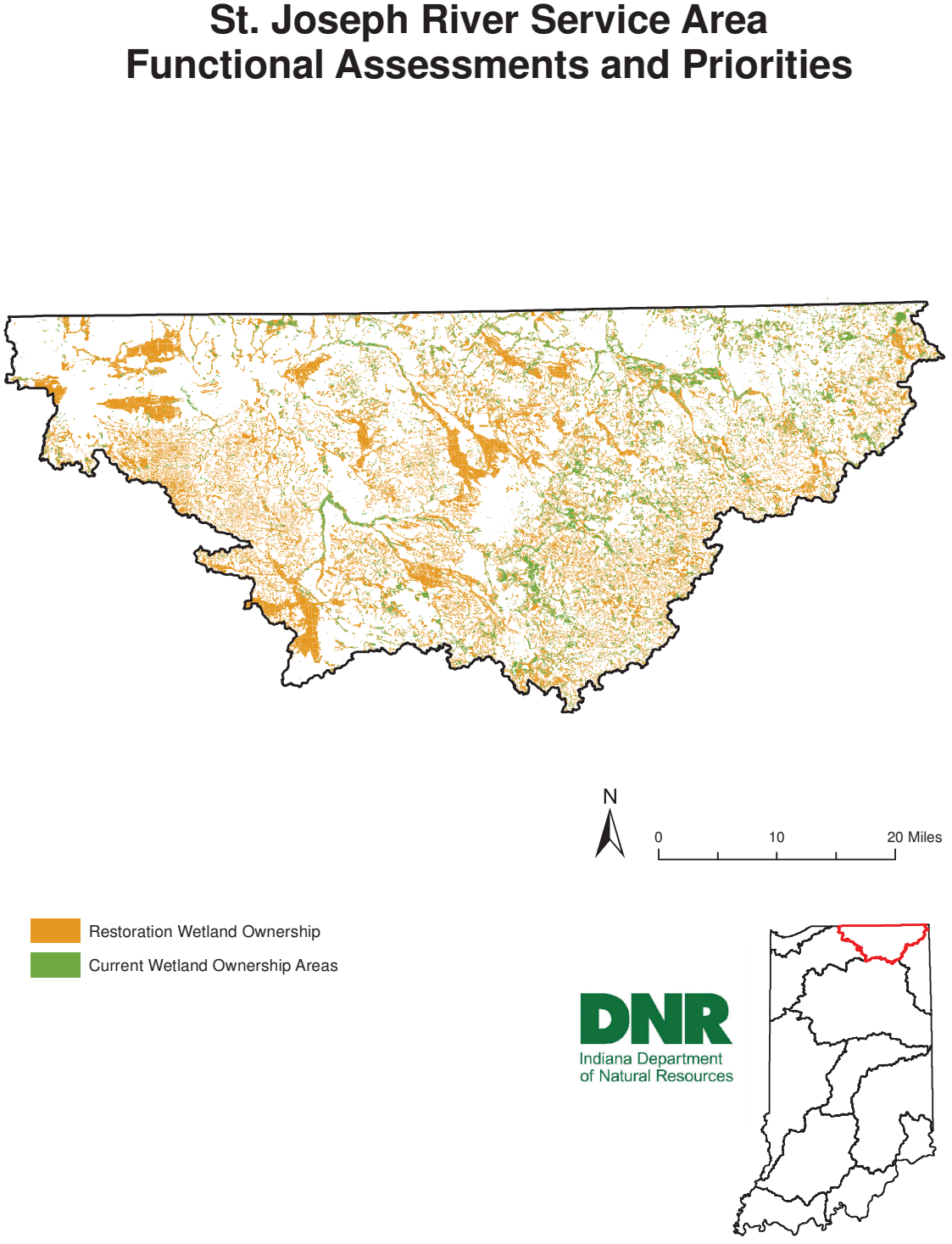

Figure 43. LLWFA priority wetland restoration and existing wetland locations (dataset includes ownership). Friends of the St. Joe, 2013. (IWPP, 2015)

ELEMENT 9. LONG TERM PROTECTION AND MANAGEMENT

Long term protection and management strategies will be conducted in the same manner per SA as outlined in the statewide CPF.

ELEMENT 10. PERIODIC EVALUATION AND REPORTING

Periodic evaluation and reporting on the progress of IN SWMP will be conducted in the same manner per SA as outlined in the statewide CPF.